Parameters of HOM for Tevatron Cavities

Prepared by V. Lebedev from a handwritten note of Ding Sun (x.8016) at Jan.25-27, 1995

There are 8 cavities all together combined so that four of them accelerate protons and other four accelerate antiprotons

Parameters of HOM of a cavity

Mode #	f_0 [MHz] Resonant Frequency	Q	R/ Q [Ω]	Notes
1	53.11375*	6523	109.60	
Δ 2	56.50625	3620	18.81	(need to be remeasured)
3	158.2325	6060	11.68	
4	310.6775	15923	7.97	
5	424.24875	6394	1.28	
6	439.7725	13728	5.23	
Δ 7	498.4975	8326	<0.01	
8	559.4825	13928	6.73	
Δ 9	583.39375	8986	0.11	
Δ 10	592.39375	10402	0.21	
Δ 11	664.7125	13763	0.35	
12	748.1800	13356	10.90	
13	768.030	16191	2.47	

* Nominal RF frequency is 53.105

Δ: phase shifts are $< 1°$ (limit of measure)

$$\frac{R}{Q} = \frac{1}{pa^3 k e_b} \frac{\left[\int \left(\frac{\Delta f}{f}\right)^{1/2} dL\right]^2}{2w_0} = \frac{1}{8p^2 a^3 k e_b f_0 Q}\left[\int (\tan \Delta f)^{1/2} dL\right]^2$$

a = 0.375" - radius of bead,

$k = \frac{e-1}{e+1}$,

$\Delta\phi$ - phase shift during a bead pull

$\varepsilon_0 = 8.85 \cdot 10^{-12}$

Note: Bead is relatively large (compared with gap), results are not very accurate.